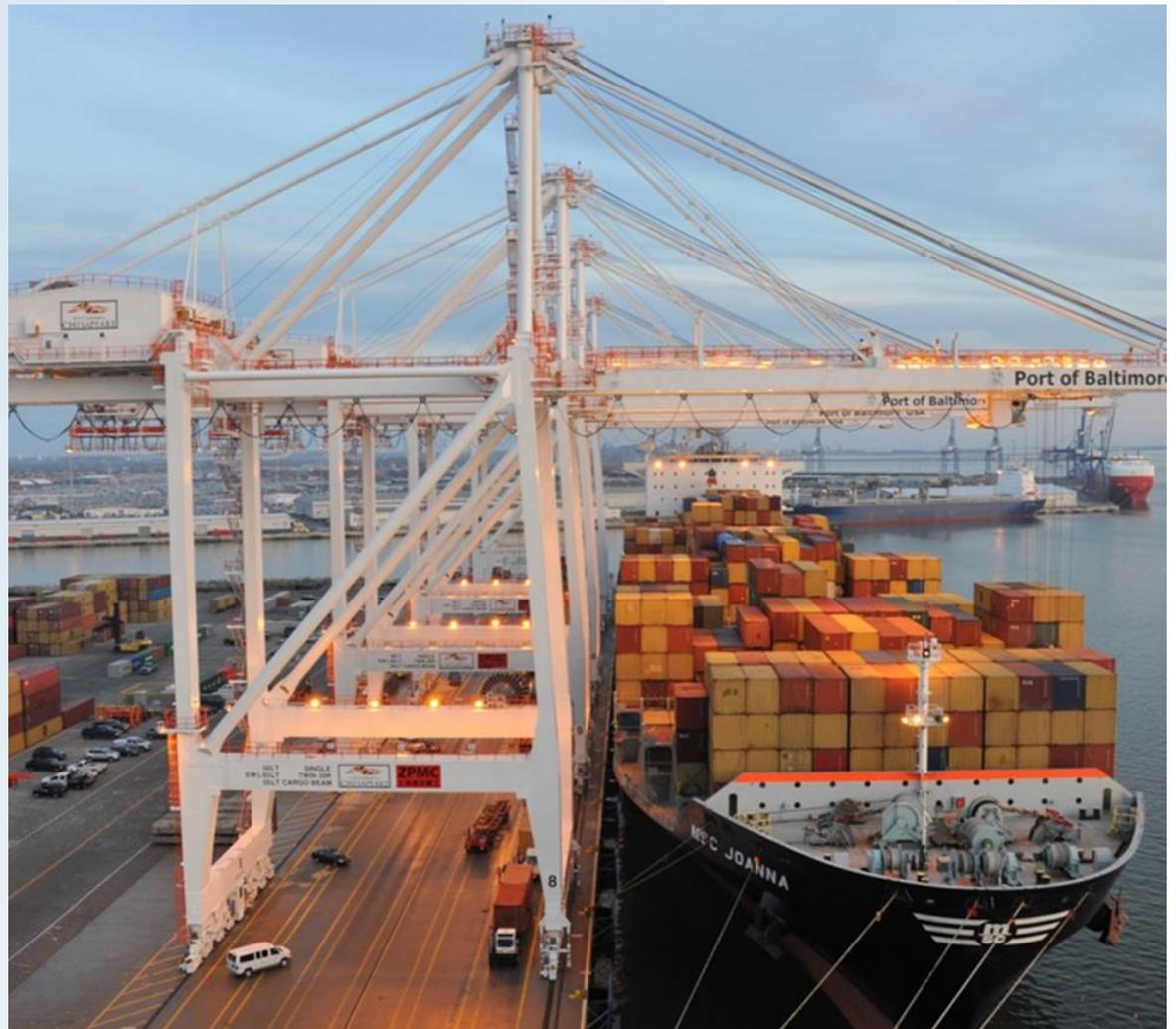


MEGA SHIPS: MEGA SOLUTIONS OR MEGA PROBLEMS?

PLANNING & ANALYSIS PERSPECTIVE

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*FHWA Talking Freight
May 17, 2017*



OVERVIEW

- **Analytical Example**
- **Problems of Volume**
- **Problems of Dimension**
- **Problems of Commerce**
- **Problems of Finance**

ANALYTICAL EXAMPLE

➤ **Using Terminal Simulation Demand Model**

- Robust, reliable, detailed modeling of flow and inventory

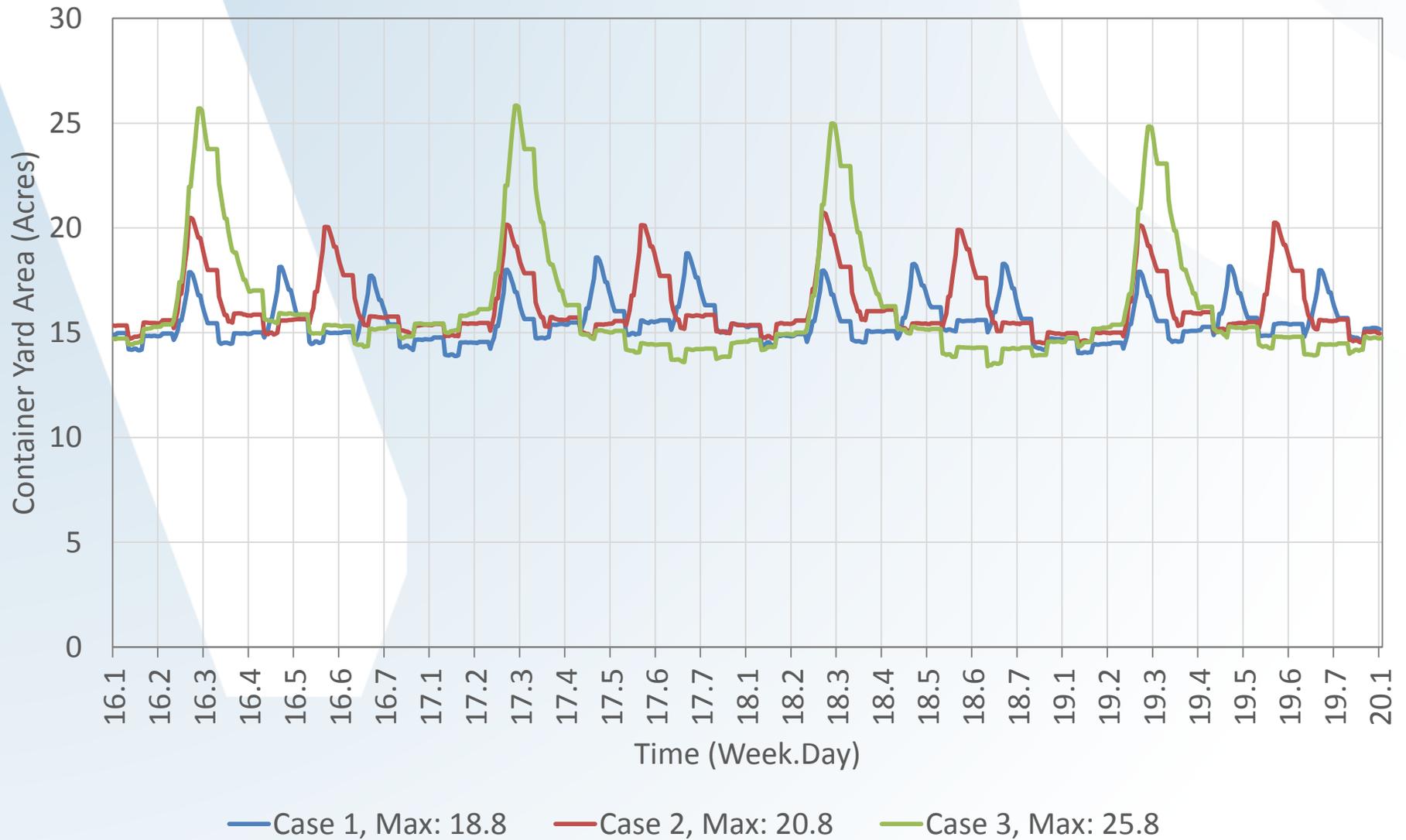
➤ **Three Cases:**

- Three ships per week, 1,000 lifts per call, Days 2, 4 and 6
- Two bigger ships per week, 1,500 lifts per call, Days 2 and 5
- One big ship per week, 3,000 lifts per call, Day 2

➤ **Common elements**

- Same annual volume: 156,000 lifts per year
- Maximum call duration is two working days
- 7-day gate operations
- US West Coast values
 - Empty/Full, Import/Export, Gate/Rail
 - Storage modes and densities
 - Dwell times and distributions

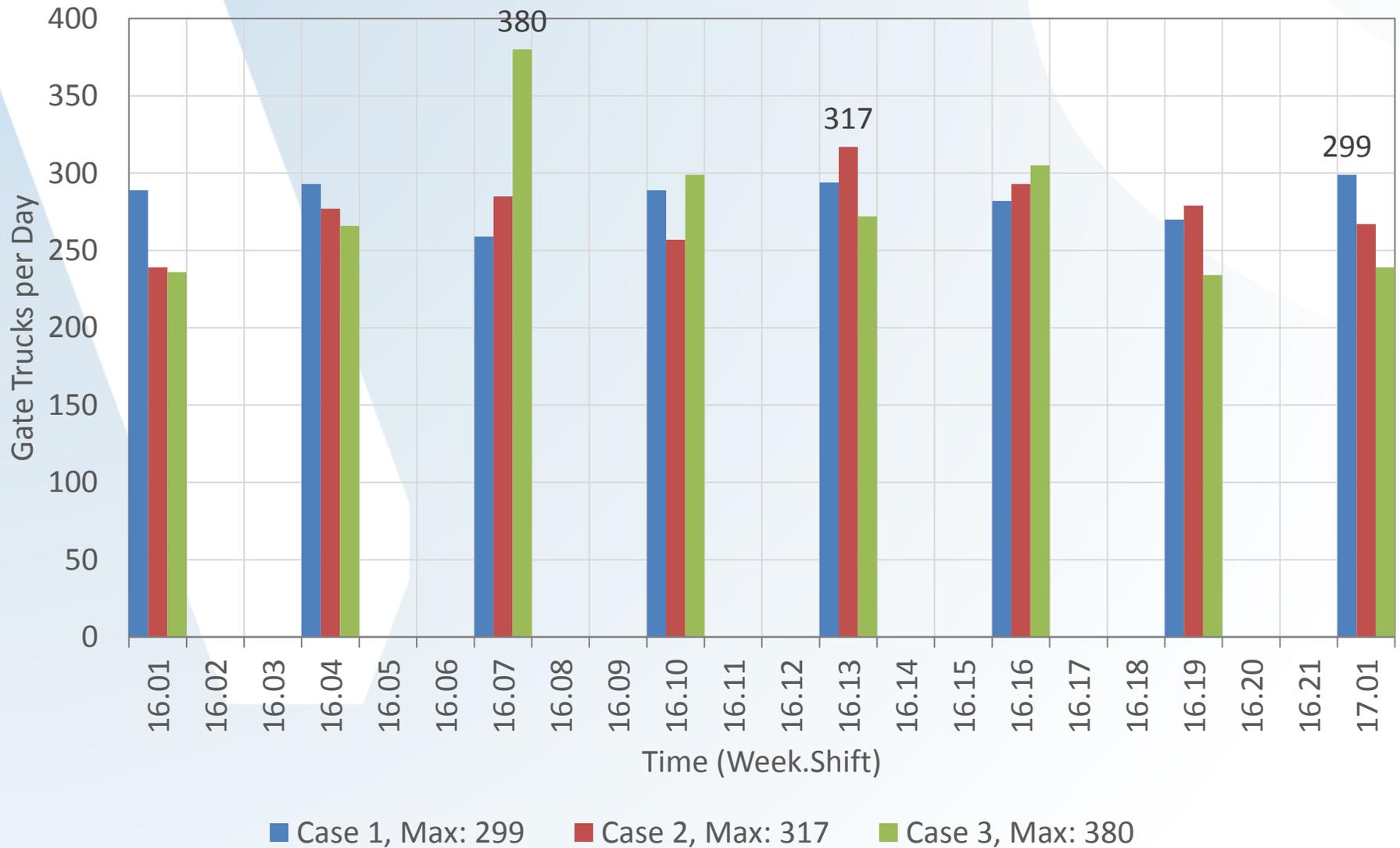
ANALYSIS: YARD AREA



Increased storage area for same volume:
Case 2: +11%, Case 3: +37%



ANALYSIS: GATE FLOW



Increased boundary flow for same volume:
Case 2: +6%, Case 3: +27%



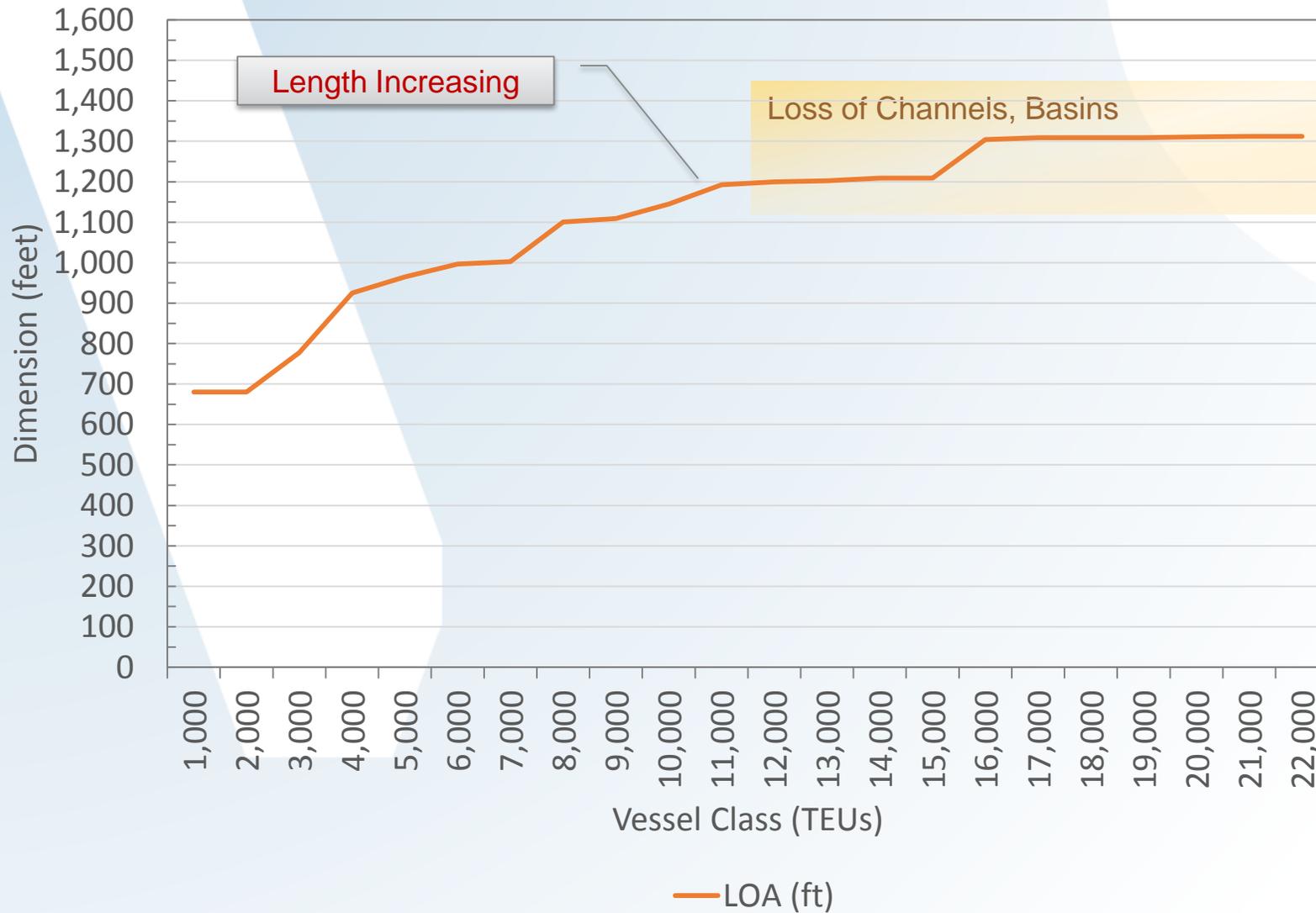
PROBLEMS OF VOLUME

For the same volume, consolidation into fewer calls:

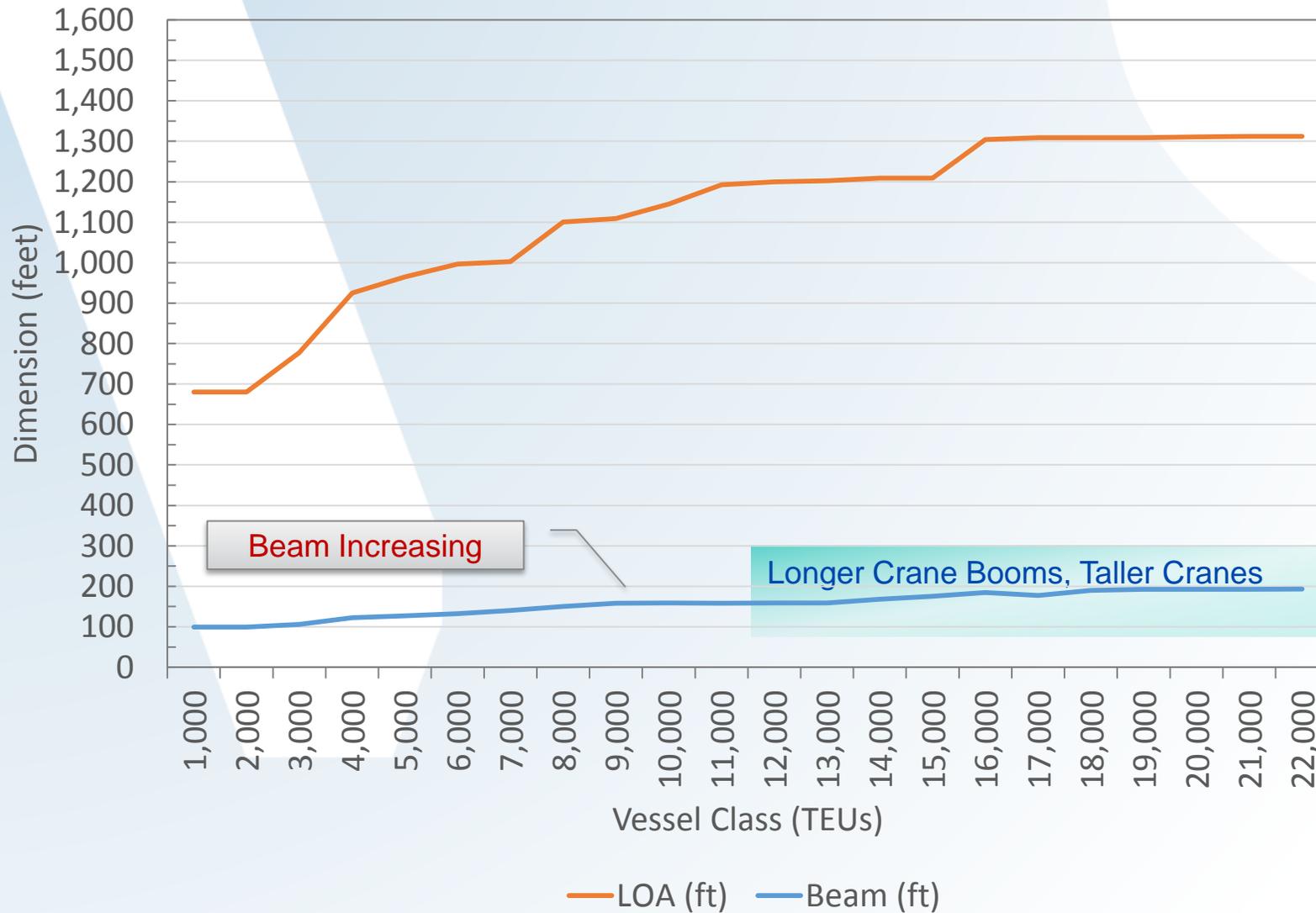
- Increases storage demand
- Increases storage area required
- Increases boundary flow rates – gate and rail

- To keep the same call duration, supporting the same vessel *deployment pattern*:
 - Case 1 required 2 ship-to-shore (STS) cranes
 - Case 2 required 3 STS cranes
 - Case 3 required 4 STS cranes
 - Each STS crane is supported by a fleet of yard equipment
 - More yard equipment and labor are needed

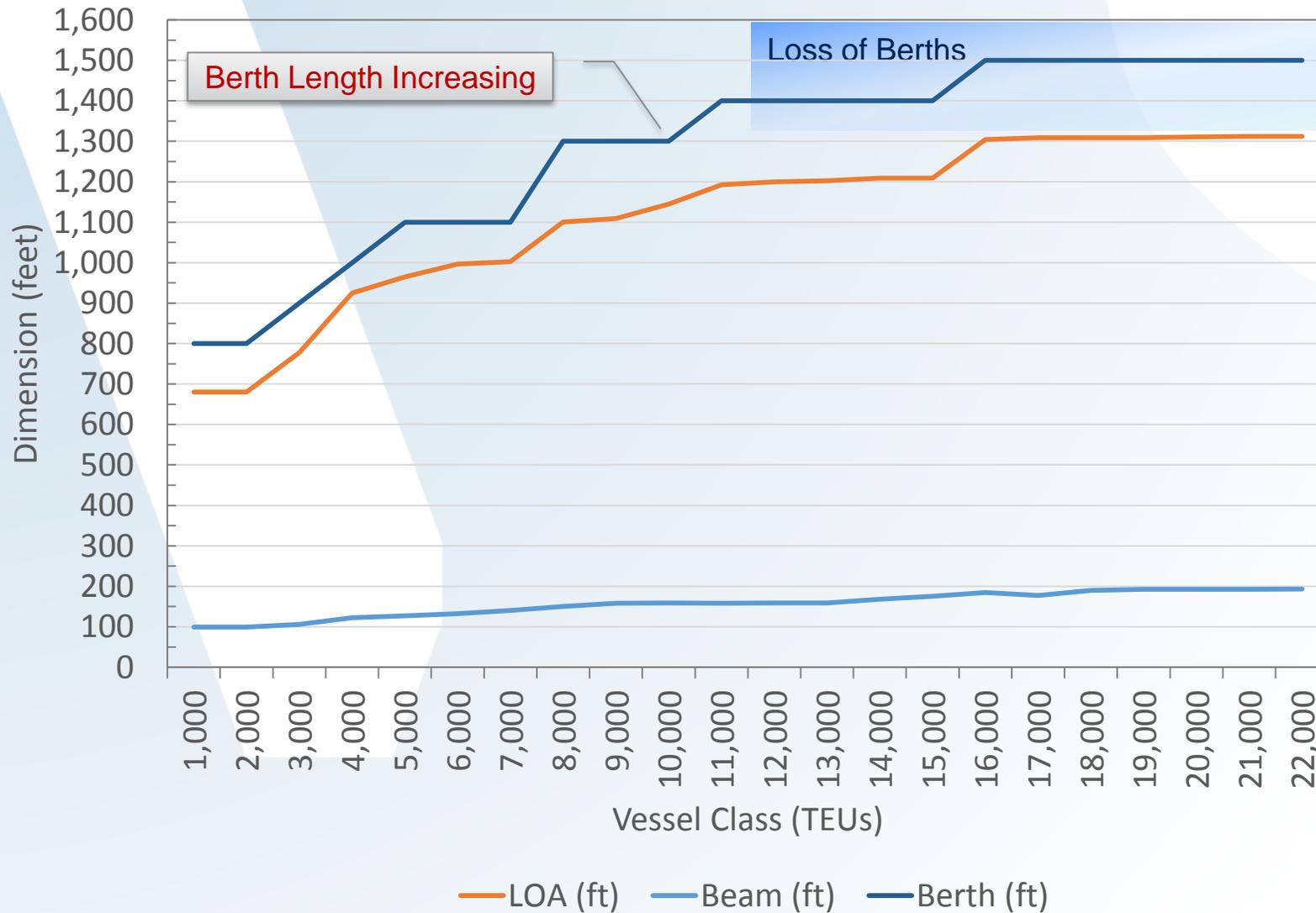
PROBLEMS OF DIMENSION



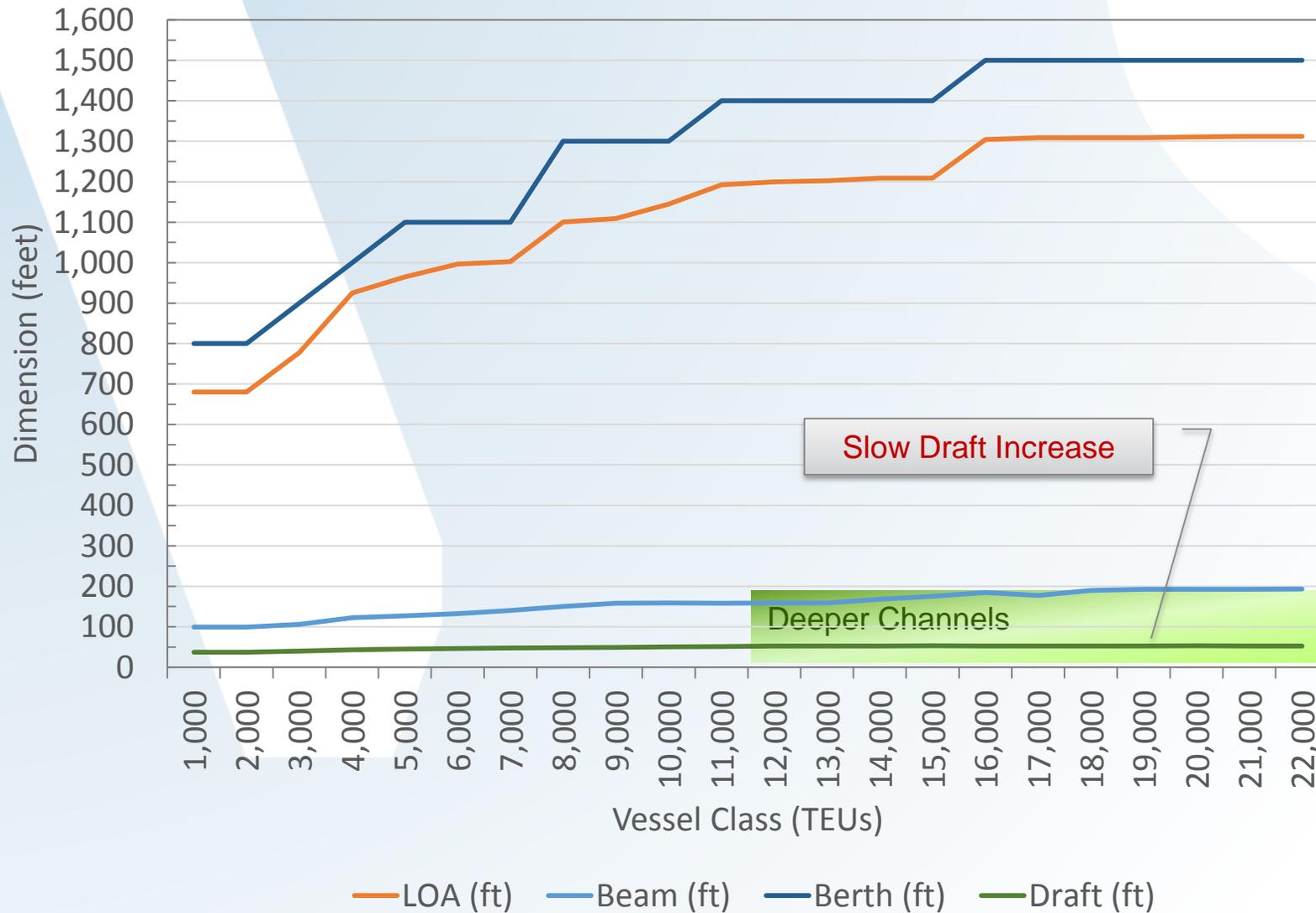
PROBLEMS OF DIMENSION



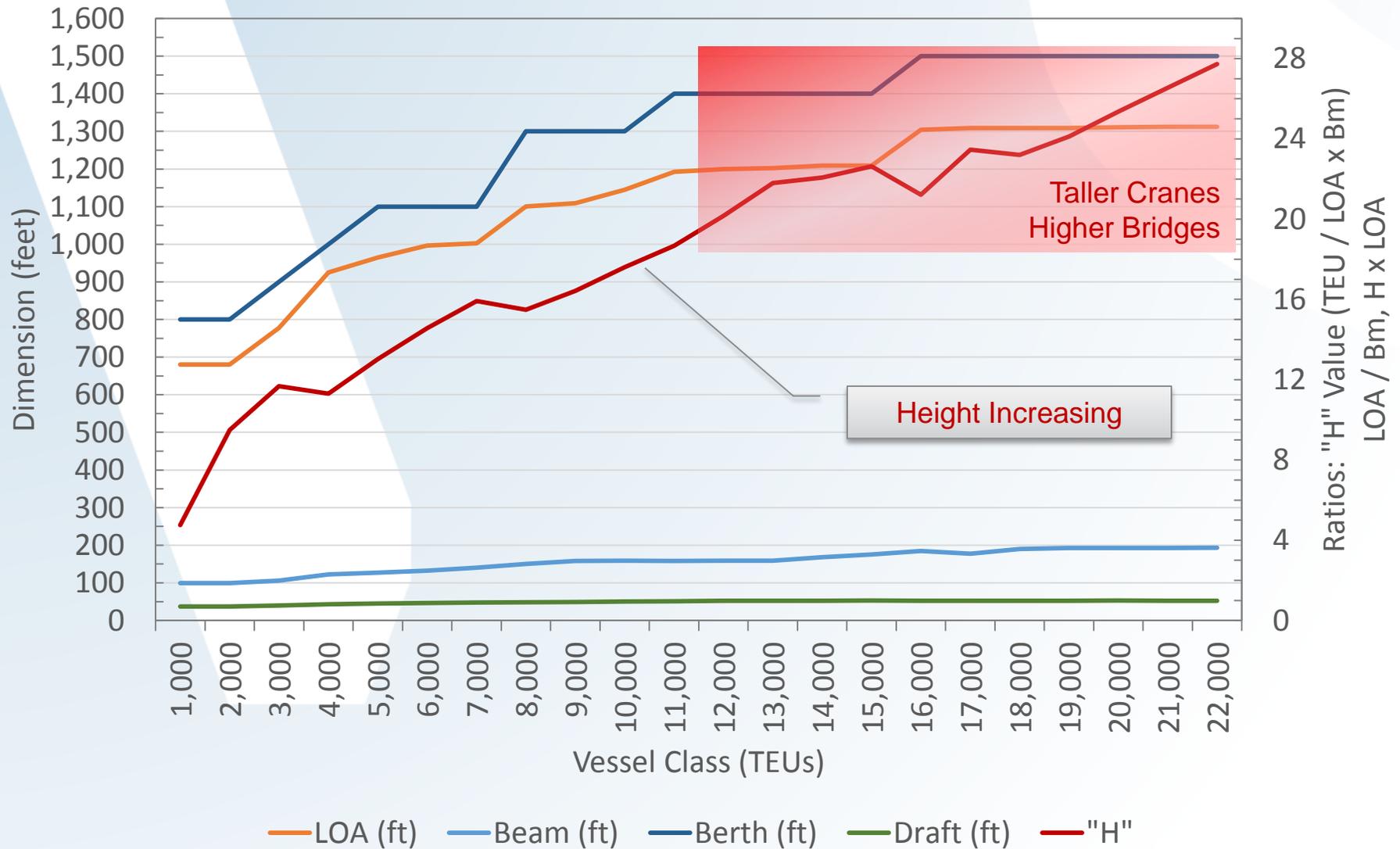
PROBLEMS OF DIMENSION



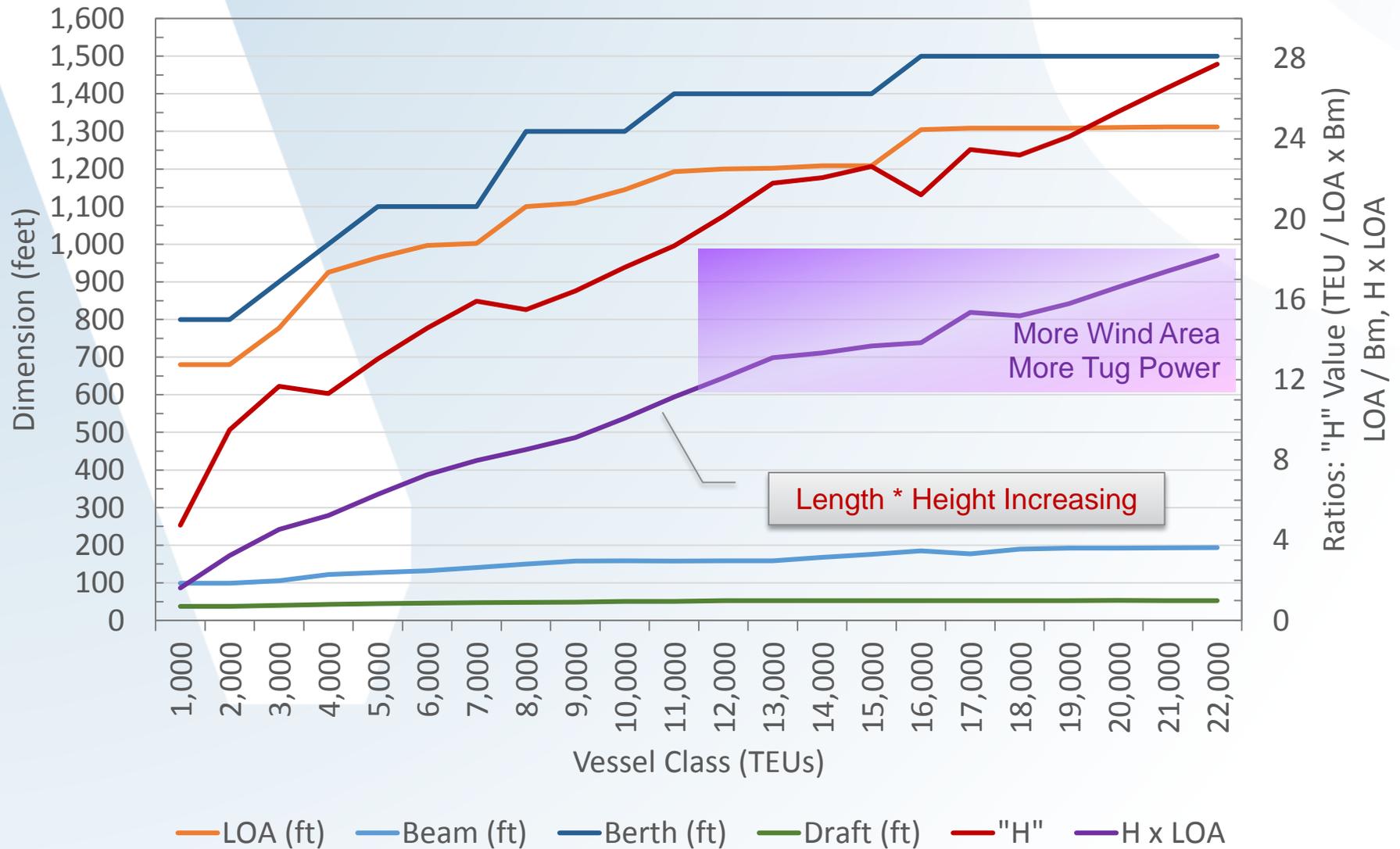
PROBLEMS OF DIMENSION



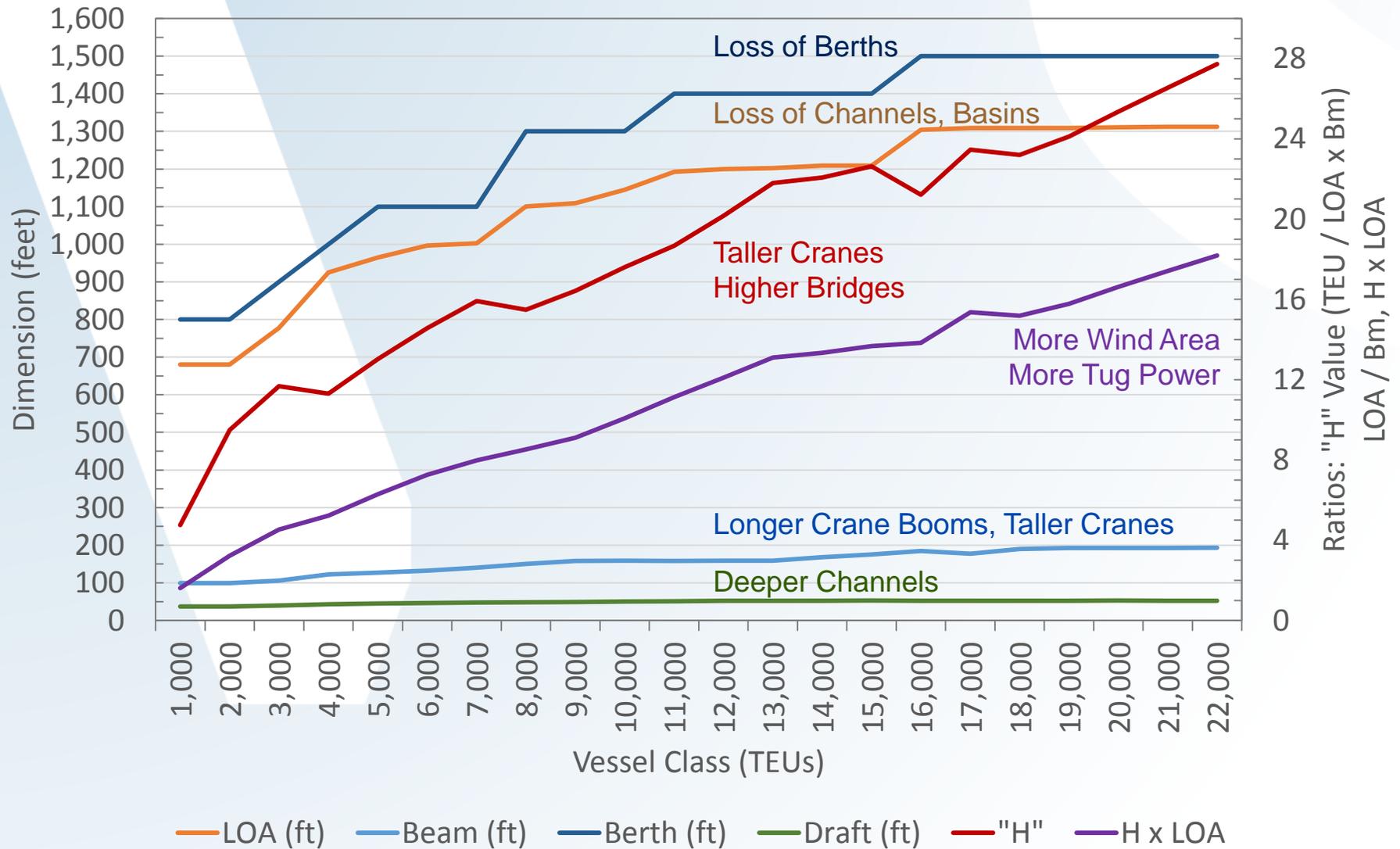
PROBLEMS OF DIMENSION



PROBLEMS OF DIMENSION



PROBLEMS OF DIMENSION



PROBLEMS OF COMMERCE

➤ **Shift to liner alliances sharing terminals**

- Terminal looks like a public terminal, rather than dedicated
- Terminal manages liner contracts with different T&C, performance, pricing
- Terminal may serve multiple rail operators, rather than one
- More “sorts” of containers reduce permissible yard density
- More inter-terminal shifts to accommodate variable berthing

➤ **Shift to fewer liners in fewer alliances**

- Terminal contracts with liner, not with alliance
- Alliance has authority, but no collective responsibility
- Shifts power from port to liner: ports cannot collude
- Shifts power from terminal operator to liner: operators cannot collude

PROBLEMS OF FINANCE: COST

- More container storage area
- More, and bigger, STS cranes
- Stronger wharves
- **Longer** wharves
- More supporting equipment
- Remodeled STS cranes
- Higher densities: higher operating costs
- Dredged channels – **wider and deeper**
- Expanded **turning basins**
- Taller **bridges**
- More, and more powerful, tugs
- Higher traffic impacts in the hinterland
- Some of these are “**hard constraints**”

PROBLEMS OF FINANCE POLICY

- Bigger ships mean higher terminal costs and poorer terminal service, for the same volume
- Serving bigger ships requires substantial investment in equipment and terminal space, for the same revenue
- Ports choke on bigger ships because investment in servicing them generates negative return
- Poor finance structure greatly deters private investment, putting pressure on public sources of funding
- The public doesn't understand why this is their problem